DETERMINING INSTRUCTOR ALLOWANCES FOR NAVAL SCHOOLS

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DETERMINING INSTRUCTOR ALLOWANCES
FOR NAVAL SCHOOLS

A THESIS
SUBMITTED TO THE
SCHOOL OF EDUCATION AND
THE COMMITTEE ON GRADUATE STUDY
OF
LELAND STANFORD JUNIOR UNIVERSITY
IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS
FOR THE DEGREE
OF
MASTER OF ARTS

By
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May, 1950

ACKNOWLEDGMENT

The writer wishes to express grateful appreciation to Dr. James D. MacConnell for his valuable counsel and patient guidance in the development of this study.

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CHAPTER I

INTRODUCTION

The problem. - This study was conducted in order to devise a simple mathematical formula or methodical process which could be used to determine, reliably and validly, the number of instructors required in a U.S. naval service school.

Scope of the problem. - This study considered only the time factors of instructor load; i.e. those time consuming factors of instructor load which could be measured directly or which could be estimated readily.

This study was not concerned with naval institutions of higher learning such as the U.S. Naval Academy, the U.S. Naval Post Graduate School, and The Naval War College. Attention was limited to the following types of naval schools:

> Class "P" Schools which are designed to conduct training for enlisted personnel at a preparatory or basic training level.
>
> Class "A" Schools which are designed to cover the ground work for the general service ratings of enlisted personnel and whose curricula include all technical qualifications for third and second class petty officers.
>
> Class "B" Schools which are designed to prepare enlisted personnel for higher petty officer rates and whose curricula include all technical qualifications for first class and chief petty officers.
>
> Class "C" Schools which are designed to train enlisted personnel in a particular qualification or skill which does not cover the full requirements for a general service rating. The curriculum of a Class "C" School is designed around the special qualification or skill desired.

> "Functional" and "Officer-Technical" Schools which are designed to provide training in specialized functions such as mine warfare, harbor defense, and explosive ordnance disposal. A school of this type may be designated either "functional" or "officer-technical" or both, depending upon the identification of the student body.

Although only the above schools, which are under the management control of the Bureau of Naval Personnel, were polled, the procedure followed herein could be used, with equal effectiveness, to determine the instructor requirements of any similar service school.

Need for the study. - The need for this study was threefold; 1) to acquaint naval personnel with the field of educational research, 2) to compare teacher loads in the civilian and naval situations, and 3) to correlate teaching efficiency with economies in the naval service.

In the past, the number of instructors assigned to each naval service school has been dependent upon the planned student population. Consideration of other factors of instructor employment have been reflected in reduced student/instructor ratios or have been neglected entirely. But the student/instructor ratio has not depicted the true instructor load. Consequently, this study was needed, primarily as a basis for further research, to summarize all factors of instructor load and to indicate their relative importance.

Generally the use of student/instructor ratios has been uneconomical. On one hand, when the ratio used has permitted the assignment of an excessive number of instructors, the loss has been quantitative. On the other hand, when the

ratio used has resulted in understaffing the faculty, the effectiveness of instruction has been lowered and the loss has been qualitative. Only when the ratio used happened to fit the instructional load of the school has it been possible to maintain the desired balance of quantity and quality.

The data presented in this study could be put to use advantageously by:

1. Administrators of the overall naval training program
    a. To determine the instructor allowance for each school.
    b. To plan the training program to fulfill the mission of the Navy.
    c. To plan the establishment of additional schools.
    d. To correlate economy with effectiveness of instruction.
    e. To avoid "slide rule" personnel reductions.
2. School administrators
    a. To measure instructor employment.
    b. To equalize instructor loads.
    c. To serve as a reference and bibliography in the field of instructor employment.
    d. To improve the morale of instructors through recognition of their duties.

Method of conducting the study. - An examination was made of current civilian and military literature regarding the elements and measurement of teacher load. The factors of instructor load in naval schools were measured by means of a questionnaire addressed to the school administrators.

CHAPTER II

ANALYSIS OF THE PROBLEM

A. Top-Level Planning

For the Navy

Fundamentally, planning for the naval establishment involves the development of a proposed budget and the proportionment of funds appropriated.

The mission of the Navy for the forthcoming fiscal year is determined by the President and officials of the defense establishment. From the mission assigned, the Navy determines the roles of all naval activities and proposes a budget based on these roles. The budget, as proposed, is reviewed, analyzed, justified, and pared by defense and budget officials before it finds its way into the President's annual budget message to Congress. Funds ultimately provided in the Appropriations Act are the maximum that may be spent.

Based on the Appropriations Act, the Navy evolves the Basic Naval Establishment Plan and its component, the Personnel Allocation Plan, which makes broad allocations of personnel on a functional basis and assigns planning cognizance over groups of functional activities. Development of the Personnel Allocation Plan presents a major problem, that of dividing personnel among the many activities, with due regard for the mission of each activity and the total number of

personnel available (authorized). The distribution is influenced by the recommendations of the fleets, and of the bureaus and offices exercising planning cognizance.

The Personnel Allocation Plan is translated into activity allowances by the Bureau of Naval Personnel. Since the total number of personnel is fixed, an increase in one allowance must be reflected by a corresponding decrease in another. Therefore, once established, these allowances are relatively stable -- for the current fiscal year.

Throughout the above planning stages, the mission of the Navy, and of its activities, remains unchanged. When compared with the original proposals, the final budget reflects monetary reductions and, therefore, personnel reductions. These reductions can be absorbed either through 1) elimination of some activities or 2) percentile reductions throughout the establishment; generally the latter course is chosen. This procedure has been dubbed "slide-rule planning."

For Naval Schools

Each naval school is one activity involved in the overall planning previously described. For convenience of administration, the general service schools are under the planning cognizance of the Bureau of Naval Personnel.

The excellence, or quality, of instruction desired of a school is determined by the mission of that school. With a given number of instructors available, either the excellence

of instruction can be attained in a limited number of schools adequately staffed or a reduced quality of instruction can be attained in all schools inadequately staffed. Assuming that instructor allowances, as originally proposed, were a minimum for adequate instruction, the detrimental effect of "slide-rule planning" on the quality of instruction can be seen.

The total number of students and instructors allotted the general service schools is fixed by the Personnel Allocation Plan. The number of students that need be trained in each school is predicted from knowledge of the Navy's mission. The instructor allowance for each school is then determined by application of a student/instructor ratio which may vary somewhat depending upon the technical level or the type of instruction to be given but tends to hover in the vicinity of ten. In a similar situation, it was deemed that the use of such a "yardstick" is arbitrary, unrealistic, and unsatisfactory and, in addition, it is invalid for it is not correlated with the activities comprising instructor employment.[1] However, even if this "yardstick" were valid, it would not solve the problem of maintaining adequate instructor allowances with fluctuating enrollments.

From knowledge of the number of students to be trained, quotas and convening dates for each course are established. Quotas are contolled by the Bureau of Naval Personnel.

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[1] Department of the Army, Survey of the Educational Program, The Adjutant General's School, Camp Lee, Virginia, May, 1948, 33-4.

Combination of known factors (quota, frequency of convening dates, and length of course) permits calculation of the planned student population of a course and of a school. However, the convening classes vary in size, sometimes considerably, due to the unavailability of personnel for training or due to the increased or decreased demands placed on a particular phase of the training program.

What are the effects of fluctuating enrollments? First of all, instructor allowances are constantly outmoded if measured by the student/instructor ratio. Secondly, since the total number of students in the overall program is fixed, a decreased enrollment in one course is counteracted by an increased enrollment in another. Consider the case of a decreased enrollment; instructors must be available to teach all courses offered. In the extreme but not uncommon situation of zero enrollment, assigned instructors represent wasted manpower. On the other hand, a small class requires approximately the same amount of instructor time as does a larger class and the result is inefficient use of manpower. In the case of increased enrollments, there is, for the particular course, a certain maximum number of students that can be accommodated without increasing instructor time. Beyond that maximum, the class must be subdivided into sections of effective size for the instruction involved and more instructor time is required.

Reductions of instructor allowances may be effected because of a permanent reduction in the planned student load

or because of reductions throughout the training program. In the latter case, "slide-rule planning" is again invoked. Increases to instructor allowances are comparatively rare and represent a recognized need, such as that resulting from a substantial, permanent increase in the planned student population or the addition of a course.

It is readily apparent that a valid "yardstick" for determining instructor allowances is needed for:

1. Translating the mission of each school into monetary terms for inclusion in the proposed budget.
2. Translating the final budget into the instructor allowance of each school.
3. Effecting overall reductions of instructor allowances with the consequent reduction of courses or overall efficiency, whichever is more acceptable.
4. Revising instructor allowances to accomodate increases in student enrollment.
5. Revising instructor allowances to accomodate the addition of courses to existing schools.
6. Determining instructor allowances for duplicated schools or courses.

B. The Student

Fortunately, classes in the naval schools are comparatively homogeneous in that each member has undergone essentially the same process of selection and on-the-job training. Selection procedures for enlisted personnel include such considerations as aptitude and ability test scores, previous training and experience, personal characteristics, and personal evaluation by superiors, all of which tend to group students of similar qualifications.

Selection procedures for the officer differ somewhat in that commissioned status itself is determined by many of these factors. Therefore, selection of officers for training is more individualistic and depends on more specific aptitudes and personal preference.

Designation of Class "A" training is based primarily on the considerations listed above. But the particular assignment may not be the man's stated preference. This situation may create personal dissatisfaction and deter motivation to the course, for the student is interested in the fulfillment of his desires no matter how they have been prompted. This situation should not be minimized or disregarded for, at this time, the student is being committed to a career. This situation is less common in the more advanced courses because the student is already pursuing a previously selected career. In this case, the student is more readily motivated because mastery of the subject matter facilitates promotion.

Most courses are of short duration (less than a year). Therefore, demotivation due to family problems is aggravated by the temporary status of the student. Not all of these problems can be left at home.

C. The Instructor

It is desired that the instructor be proficient both in the subject he is to teach and in the teaching process. But, when a choice must be made, which of the two should be used as a basis for selecting instructors? During the recent war

years, the Navy called upon professional, civilian educators to develop and staff its rapidly expanding training program. The success of their efforts is a partial answer to the question. But, the continued employment of large numbers of civilian educators is too expensive for the Navy's peacetime budget. Consequently, the vast majority of naval instructors must be selected from the rank and file of naval personnel. Also, instructors selected should be of sufficient military status to ensure military rapport in the classroom.

What basis for selection should be used to ensure a proficient corps of instructors? "Primary interest in instructing and ability to do so are the most important factors to consider in the selection of potential instructors."[2] Pursuing this course of action, the Navy invites requests for instructor duty; the commanding officer concerned is required to attach an evaluation of the man's probable instructional ability. But is this procedure reliable? In many cases it is not. Frequently requests submitted have been motivated by the desire for "shore duty" rather than the criterion, the desire to teach. In addition, evaluation of informal instructional abilities may not correlate with formal instructional abilities. Many potentially good instructors do not desire this duty knowing that the instructor must give more hours of more strenuous and less familiar work than is

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[2] Department of the Army, Survey of the Educational Program, op. cit., 38.

required by a "desk" job. Nonetheless, this procedure is the best available; more serious difficulties are encountered when it cannot be applied.

Often, in a specific field of training, the demand for instructors exceeds the number of requests for instructional duty, and more primitive selection methods must be used. In such cases, selection may be based on one or more of the following circumstances:

1. Successful prior graduation from the particular school or from a similar school.
2. Service reputation.
3. Previous professional experience.
4. Caliber of personal record.

Generally, personnel selected for instructional duty are professionally well qualified by their experience, training, and specialization. But, in evaluating instructional efficiency, it must be borne in mind that these instructors are not professional teachers; had they desired to pursue that career, undoubtedly they would have trained for it and would not now be in the Navy.

Before he can stand alone before the class, the potential instructor must receive training in two areas. First, he must learn some effective teaching techniques for which purpose he is given an instructors course of four weeks duration. Obviously, in this time, he can obtain only the barest foundation upon which he must later build. Secondly, he has a working knowledge of the subject(s) he is to teach but he

does not know the "hows" and "whys" required of an instructor. So, he must become fully informed professionally. Presumably, this task can best be accomplished at the school to which he is assigned. Too frequently this phase of his indoctrination is neglected either because his services on the platform are urgently needed or, perhaps, because the local authorities do not recognize the need.

Upon reporting to the school, the potential instructor undergoes a "breaking in" period concurrent with or independent of his instructional time. He must acquaint himself with the school, its equipment, its methods, and the details of its curriculum. Also, he must learn the military structure of the parent station; its policies, its rules, and its facilities. This information is essential to the instructor and should be made available to him prior to his qualification as an instructor. Some methods used to impart this information are:

1. Enrolling in the course or parts thereof.
2. Auditing classes.
3. Receiving the personal attention of a supervisor, the instructor he is to replace, or some other person.
4. Practice teaching.
5. Administrative interviews and consultations.
6. Personal tours.

Ideally, each instructor should be assigned a proportionate share of the school's total instructional load. But, with the constant personnel turnover encountered in the naval

service, these "proportionate shares" are in a constant state of adjustment. The new instructor is a relatively inefficient member of the staff and will remain so until he gains proficiency through experience and training on the job. What is the rate of improvement and what is its relation to the length of a tour of duty (24 to 30 months)? This question can be answered only by opinionation. In an appraisal of a similar military situation, it was stated that, "even at the maximum established tour of duty of three years, an officer spends the first year largely in the stage of preparation, the second year in becoming experienced as a teacher and the third year in becoming proficient."[3]

Similarly, what is to be done about the unsuitable instructor who is unable to carry his proportionate share of the load? Machinery for the replacement of such personnel exists but that machinery is cumbersome and entails much delay. Detachment of the unsuitable instructor without relief would impose an increased work load on the other instructors. Retention until relieved is only the lesser of two evils in that it imposes less of an increased work load on the other instructors.

D. Instructor Load

This study was premised on the theory that a job analysis of each instructor's job will reveal the total instructional

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[3] Department of the Army, Survey of the Educational Program, op. cit., 38.

load of the school. In turn, by application of standards of employment, the number of instructors required to accomplish the total instructional load can be determined mathematically. But first those standards must be established; what is to be the total work week?; what portion is to be devoted to teaching?; how much to other duties?

The total instructional load, considered solely from the viewpoint of time utilization, is composed of four categories; 1) the formal load, 2) the informal load, 3) the load imposed by administrative circumstances, and 4) the load of contingent unavailables.

The Formal Instructional Load

The most obvious and most easily computed portion of the instructors' time consuming tasks is that of instructing. This portion of the load may be computed directly from the published, or otherwise committed, schedule of classes.

Course hours. - The patterns of scheduled instruction in naval schools are many and varied. Some courses enroll only one class at a time; for example, a course eight weeks long convening every eight weeks. Some courses enroll only one class at a time and schedule intermissions between courses; for example, a course eight weeks long convening every ten weeks. Some courses enroll more than one class at a time; for example, a course eight weeks long convening every two weeks.

In many schools, courses offered to personnel of the naval reserve on annual training duty for two weeks impose complications.

Despite efforts to include them in regular courses, reserve personnel cannot be expected to profit from two weeks of instruction gleaned from the middle of a highly technical course. The only alternative that will ensure profitable instruction is a separate course. Such training tends to be seasonal; when there are no students there need be no instruction. Special courses, such as Class "C" and functional training, create similar difficulties.

It may be apparent that for each course there is a schedule of instruction. This schedule represents the number of course hours offered and is indicative of the number of instructor hours that the school is obligated to provide. Therefore, each hour of instruction scheduled should contribute to the computation of instructor allowances.

For each course, the average number of hours scheduled per week may be determined by the following formula:

$$CH = SW \times \frac{LC}{FC}$$

CH - average course hours per week.
SW - length of the school week in hours.
LC - length of the course in weeks.
FC - frequency with which the course convenes, in weeks.

The class hour load for the school is the sum of the class hour loads of all courses taught. Isolated periods of instruction may be treated as separate courses. For example, if the school details one instructor to attend the weekly sessions of a local reserve unit and the session is for two hours, CH = 2.

Class size. - Most naval courses involve, in part, the actual use of highly technical equipments and component parts thereof which place physical restrictions on the number of students that can be instructed at any one time. These restrictions are the number of equipments available, the personnel capacity of each equipment, or the arc of visibility about the equipment. Therefore, class size need be considered for it indicates the necessary division of the enrolled class into sections for these physically restricted phases of instruction.

The ultimate effect of classes restricted in size is to increase the number of instructor hours per course hour. Consider briefly the course which has enrolled thirty students but whose practical phase is limited to ten students per instructor, although equipment is available for thirty students. One instructor can present the material in three successive periods; one section in class and two sections waiting or studying. On the other hand, three instructors can accomodate all sections at one time. Either way three instructor hours are required to conduct one course hour of instruction for each student. But, in the first case, 40 student hours have been lost. If student time is of importance, the latter situation is more desirable.

The Informal Instructional Load

Certain time consuming factors are directly related to the instructional process. These factors are concerned with

the curriculum, training aids used, individual instruction, and student conferences and interviews. Certain of these functions may be departmentalized in the particular administrative organization. However, these functions are dependent upon instruction given, not upon the identity of the personnel performing them, and therefore, should be incorporated in the total instructional load of the school.

Preparation and revision of lesson plans. - In the civilian situation, the subject matter of practically all courses is unchanged from year to year. Because similar courses are available in numerous schools throughout the country, the subject matter is logically and effectively presented in a variety of textbooks. Often, the textbook may be used as the course itself; preparation consists of dividing the textbook into appropriate lessons and clarifying the phraseology of the textbooks. Such preparation constitutes the syllabus for the course and is reusable with each repetition of the course. In contrast, the effect of curriculum preparation and revision on the typical naval instructor's time and frustration is considerably more involved.

The subject matter of most naval courses is highly technical in nature and is subject to frequent change. Since courses are localized in one or two schools, textbooks, as such, are not available; course material is contained in numerous technical manuals and references. Whenever a course is established, the Bureau of Naval Personnel provides the school with a course outline which defines the areas of

instruction and the time to be devoted to each area. But, before the presentation phase can be undertaken, the materials of instruction must be assembled into an integrated course of instruction. This task befalls the instructional staff and, generally, is undertaken as a school project. The resulting detailed plan of instruction, known as the lesson plan, is perpetuated so that subsequent instruction will be consistent and so that the preparation phase need not be repeated by each new instructor.

To be effective, lesson plans must be current; they must be revised to incorporate technical advances when occurring. Such revision is more frequently necessitated by subjects undergoing more radical or more rapid technical change.

The processes of preparation and revision must be applied similarly to all exercise material issued in conjunction with the lesson plans; laboratory exercises, study guides, diagrams, etc.

Preparation for classroom presentation. - Although lesson plans and other materials of instruction have been prepared, still the instructor is not adequately prepared to teach the class. Before he mounts the rostrum, he must reorient his thoughts by a review of the lesson plan, he must accumulate the materials of instruction, and he must ensure that those materials are correct or that they are functioning properly.

One important but easily overlooked item of preparation is the timeliness of the instructor's professional knowledge;

his awareness of technical advances related to his subject. By virtue of his position, the instructor is expected to have analyzed the situation and to have formulated an "expert" opinion. Fulfilling this expectation may entail considerable research.

Probably preparation for a lecture involves the most preparation because the presentation is entirely verbal. The time required varies with the individual instructor, depending upon his ability and experience, and upon the reusability of the material.

Training aids and other equipments require preparation for use. This entails varying amounts of time depending upon the location, availability, complicity, and operating features of the equipment, the instructor's familiarity with the equipment, and the availability of assisting personnel.

The reusable pencil and paper type examination involves negligible preparation. However, if a new exam or quiz must be prepared for each class, the time requirement is infinitely greater. Preparation of an exam or quiz of the practical type is similar to preparation for the practical period.

Design, manufacture, and repair of training aids. - Training aids of all kinds are used extensively in naval schools. Many are furnished by the Navy; many more are manufactured locally. Aids furnished by the Navy tend to cover only the broad aspects of the subject. Usually it is found that more specific aids are needed in the instructional situation.

The design of the training aid to be manufactured locally is the responsibility of the individual instructor for he must integrate the aid into the instruction. The time involved in design may vary from mere designation of a chart to be copied to the more complicated task of sketching or drafting plans.

The time that the instructor must spend in manufacturing and repairing training aids is dependent upon the assistance available. If the work is accomplished by shop personnel or other agencies, the time involved should not be included in the instructional load.

Individual instruction. - Individual instruction is concerned with the assistance given the individual student outside of the classroom. The students most frequently seeking this assistance are members of the instructor's current class. Therefore, individual instruction might be considered a percentagewise function of class size.

The amount of individual instruction given undoubtedly varies with the instructor. Probably the conscientious and capable instructor encourages students to seek him out and is attentive to the student's questions whereas the less conscientious and less capable instructor avoids the students as much as possible.

Student conferences and interviews. - Student conferences and interviews are concerned with problems of individual differences and are designed to help the student get the most out of the instructional situation. In the conference or interview, the instructor may explore the student's level of

achievement or he may assist in solving a personal problem. But, too frequently it is limited to learning the reasons for failure or for non-completion of work.

The Instructional Load Imposed by Administrative Circumstances

Considered in this area are all duties performed by instructors but which could be performed equally well by other, less technically qualified personnel. Often these duties are imposed upon instructional personnel because of inadequate allowances of maintenance and clerical personnel. Another cause is of local origin; the failure of administrators to differentiate between instructional duties and housekeeping duties. A third cause is traditional independence which deters cooperative effort because each unit, its responsibilities and its tasks, is considered to be self-contained. By way of comparison, this consideration may be likened to the industry which permits many private secretaries whereas a central stenographic pool might prove more efficient.

The continued assignment and control of these duties must be the subject of administrative decision. If instructors are to perform these duties, they must be provided time to do so. But, recognition of these duties is of further import in that they represent areas in which instructor load can be reduced without impairing the quality of instruction. For example, a new course might be instituted with no increased instructor allowance if these duties were redistributed to non-teaching personnel.

Supervision of student activities. - Often the instructor is required to attend, in a supervisory or administrative capacity, certain non-instructional student activities such as the athletic period, the cleaning detail, the muster formation, and the marching formation. It may be argued that, during these periods, no instruction takes place in the school and, therefore, the presence of the instructor at the school is not required. However, time spent in these activities is not available for the improvement of the teaching process.

Clerical work. - The clerical work load of a school includes that required of a non-instructional activity and, in addition, preparation of the numerous materials of instruction.

Certain handwritten work is an integral part of the teaching process; the writing of lesson plans and materials of instruction, the assigning of grades, the evaluating of students, the recording of attendance, etc. But should the instructor be expected to transcribe or type and duplicate his written work?; should he be required to prepare and type administrative report? Obviously, this work must be done by someone; if clerical personnel are not available the task may befall the instructor who probably has no typing skill. Therefore, he must spend much more time than would be required of a proficient typist. In industry it has been found to be more efficient and economical to hire clerks for these tasks than to require them of the high level supervisors.

Another clerical problem frequently encountered in the school is that of issuing tools, pamphlets, and other materials. In such cases, wherein the tools or materials must be available for issue at any time, it may be necessary to place an instructor on the job -- full time. Certainly this task could be done by men of lesser professional qualifications.

Maintenance and repair of school equipment. - The school may have many pieces of equipment for use in the teaching process but the number of maintenance personnel assigned may be insufficient to ensure the continued, proper functioning of that equipment. Nevertheless, only properly operating equipment is useful to the teaching process. Thus, the instructor may be called upon to perform tasks of maintenance and repair. Undoubtedly the instructor, by virtue of his professional skill and experience, is an excellent repairman for the equipment of his profession, but such functions should not be confused with those of instruction.

In some cases, the maintenance and repair responsibilities of the instructor may be extended to the equipment of the station or outlying activities. Such tasks are even more remote from his primary duty of instruction.

Logistic activities. - Logistic functions are the services rendered by the command organization to the needs of sub-activities and personnel. These services include messing, berthing, pay, transportation, building maintenance, disciplinary control, and leave and liberty.

The logistic activities of the instructor involve his responsibilities for liason between the school and school personnel and the logistic organization; such responsibilities as the cleanliness and proper order of student barracks and inspection of liberty personnel for proper uniforms. With regard to disciplinary control, the liason responsibility of the instructor is automatic; he must appear as accuser of those delinquents he has reported.

Collateral duties. - Collateral duties are those duties of secondary importance which are essential to the proper administration of an activity but for which no personnel are specifically allowed. Therefore, these duties are assigned to available personnel in addition to their primary duties.

Generally, in the naval situation, collateral duties are considered to be assigned only to officers. This is true of those duties which require officer cognizance, such as membership on courts martial and boards of investigation, membership on auditing boards, and control of classified materials. But some collateral duties presuppose the participation of both officers and enlisted personnel; for example, collection of contributions to the numerous national and local benevolent societies. Other collateral duties, such as welfare and recreation activities, require the participation of enlisted personnel.

Those collateral duties which are assigned to the instructor depend upon the peculiarities of the particular station and school organization and upon the local administrative philosophy with regard to instructor load.

The number of collateral duties at the station level is independent of the size of the station; normally these duties are proportioned among the personnel of the various activities. The school which is a sub-activity to the station tends to create collateral duties to parallel the logistic functions of the station. Common activities in this area include the administration of appropriations, the procurement of materials, the inventory of equipments, and the coordination of welfare and recreation programs. In the school which is a command within itself, the parallel duties are eliminated but more station duties may be required of the school personnel. In the small school command many of the lesser administrative functions may be relegated to the status of collateral duties. Some collateral duties at the school level are independent of the station organization; for example, curriculum control, development and supervision.

To whom should collateral duties be assigned? Probably instructors should be included in those pertaining to the curriculum, but, for the others, the administrator may also choose from administrative, maintenance, and clerical personnel. Perhaps instructor time could be used elsewhere to better advantage.

The Instructional Load of Contingent Unavailables

In this area are considered those periods of time during which the instructor's services are unavailable to the school and are not contributing to the total instructional load of the school; time required for professional training and absences due to sickness, disciplinary action, and leave.

In-service training. - The on-the-job training of the instructor is a continuous process; its objectives are improvement of teaching skills, improvement of subject matter, and broadening of teaching qualifications.

The instructor can best improve himself and his subject through the observation of other instructors in action and through participation, as a student, in subjects directly related to his own. As a consequence, he becomes qualified to teach other subjects during the absence of regularly assigned instructors and, perhaps, he avoids becoming stagnated in a limited phase of the curriculum. In addition, the instructor of broad qualifications lends prestige to the school when he is transferred to subsequent duty assignments.

Sickness and disciplinary absences. - When the instructor fails to appear on the job, another member of the staff must teach his classes. Unfortunately, these absences cannot be planned. The qualification of instructors for such emergency substitutions is one objective of the in-service training program.

Leave. - Bureau of Naval Personnel directives require that 30 days leave of absence per year be made available to each person in the naval service. This absence amounts to twenty - 8 hour school days per year or 3.08 hours per week.

CHAPTER III

RELATED STUDIES

A. What is Teacher Load?

Definition

During the past three decades the popular conception of teacher load has undergone considerable change, a change not inconsistent with the development of human engineering principles in industry. Whereas, formerly, consideration was given only to the job to be done, later investigations were directed toward the factors underlying the performance of the job.

Reflecting opinion of the time, the U.S. Office of Education, in 1917-18, depicted teacher load as the formal, instructional committments of the school, or "the number of pupils divided by the number of teachers."[1]

The influx of students into the schools following World War I produced larger classes and longer school days. Although basic concepts of the load remained unchanged, emphasis was shifted to the formal, instructional committments of the individual teacher. A typical definition of 1925 was in terms of "...the number of pupil-hours of instruction which the teacher gives weekly."[2]

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[1] L.L. Myers, "Needed: An Objective Method of Determining Teacher Load", Nation's Schools, XXXIII (April 1943), 30, (Quotation by Myers).

[2] John C. Almack and Albert R. Lang, Problems of the Teaching Profession, (Boston: Houghton Mifflin Co., 1925), Chap XI, 193.

Today, "the teaching load is generally understood to include all activities which take the time of the teacher and which are related either directly or indirectly to his professional duties, responsibilities, and interests."[3] Thus the teacher load is considered to be not only time-consuming but self-consuming as well.

Factors Comprising Teacher Load

Agreement concerning the nature, import, and measurement of the various elements comprising teacher load is nonexistent. An overview of these factors obtained from the opinions of educators and from the findings of researchers establishes an impressive list which defies administrative consideration.

Class hours. - The number of classes to which the school is committed is determined by the curriculum; the number of teachers by the budget.

How many class hours should be assigned to each teacher? The typical high school teacher of 1923 was responsible for five daily recitations.[4] From the modern point of view, the answer to this question is conditional and dependent upon the other factors of the total load. Perhaps, for overall

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[3] *Encyclopedia of Educational Research*, ed. Walter S. Monroe, (New York: MacMillan Co., rev. 1950), 1454.

[4] C.O.Davis, "The Size of Classes and the Teaching Load in the High Schools Accredited by the North Central Association," *School Review*, XXXI (June 1923), 420.

efficiency, a lighter load of classroom teaching and a correspondingly heavier extra-curricular load should be given to those who can do and like to do extra-curricular activities.[5] The Conference of the National Commission of Teacher Education and Professional Standards concluded that

> in the light of sound educational theory, the total week should not exceed forty hours, of which fifteen to twenty hours would be devoted to instruction. ...The rest of the school week is needed for such activities as the teacher's planning and preparation.[6]

All classes are not equally demanding of the teacher's time. A distinction should be made between the classes demanding the teacher's full attendance and attention and the classes, such as laboratories, in which he is relatively free to do other work, such as grading papers.

Preparation. - Although preparation for each lesson is principally a matter of time expended, it can be affected materially by other factors, such as the nature of the subject, the different instructional fields, and experience, to be discussed later.

In his formula for measuring teacher load, Douglass assumes that the amount of total work for the duplicate preparation is reduced approximately 20%.[7]

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[5] Dennis H. Cooke, Administering the Teaching Personnel, (New York: Benj. H. Sanborn and Co., 1939), 229-264.

[6] "Teaching Load as Related to Teaching Efficiency," The Improvement of Teaching, Report of the National Commission on Teacher Education and Professional Standards, National Education Association (Chap XV), (Oxford Conference, July 1947), 115-118.

[7] Harl R. Douglass, Organization and Administration of Secondary Schools, (Boston: Ginn and Co., rev 1945), 115.

In practice, most teachers must prepare a number of different lessons each day thereby increasing the preparation time required. The typical high school teacher of 1923 was found to make three different preparations each day.[8] In one survey, it was found that the teaching of four or more different subjects increased the teaching load 41% while teaching an equal number of duplicate sections increased the load only 24%.[9] Twenty professors of the Kansas State Teachers College estimated this effect to accrue as follows:

Number of Daily Preparations	Increased Difficulty %
1	0
2	12
3	22
4	36
5	56 [10]

Preparation time is dependent upon the mode of lesson presentation. A formal lecture is a greater physical strain and involves a more careful preparation than does the informal classroom lecture or discussion.[11]

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[8] C.O.Davis, *op. cit.*, 420.

[9] P.Webster Diehl, "A Method of Measuring High School Teachers' Loads Through the Use of Subject Weights and its Application in Five New Jersey High Schools," (Unpublished Master's thesis, State College, Pa.: Pennsylvania State College, 1935), cited in *Review of Educational Research*, VII, No. 3 (June 1937), 266.

[10] Edwin J. Brown and Louis H. Fritzemeier, "Some Factors in Measuring the Teacher's Load," *Education Administration and Supervision*, XVII (January 1931), 68.

[11] Luther H. Lyon, "A Plan for Evaluation of Teacher Load," *California Journal of Secondary Education*, XX (October 1945), 346.

The following table was compiled from data presented by University of Washington faculty members:

Average Number of Hours of Work per Clock-Hour of Instruction by Mode of Presentation

Recitation	1.99
Lecture	2.98
Mixed Lecture and Discussion	2.41
Oral Quiz	1.62
Scheduled Conference	1.18
Seminar	2.24
Laboratory	1.25
Shop	1.28
Field	1.17 [12]

Preparation time is a function of the class size in classes, such as the shop and the laboratory, in which student participation is on an individual basis. Larger classes in Industrial Arts required that more equipment be cared for and that more job sheets be prepared since less individual work is possible.[13]

Individual instruction. - Individual instruction given outside of class to those students previously met in class is a percentagewise function of the class size. At the same time, the teacher may be required to give individual instruction to students not previously met in class. But, whatever the source of the students, time spent should be considered a part of the total load.

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[12] L.V.Koos, "The Adjustment of the Teaching Load in a University," U.S. Bureau of Education, Bulletin No. 15, 1919, 34-35.

[13] Frank H. Hardin, "The Teaching Load of the Shop Teacher," *Industrial Education Magazine*, XXXII (December 1930), 183.

Cooperation. - The sponsoring of school plays, athletic activities, and other public performance activities have become closely identified with the school. Frequently, those functions have been called "extra-curricular activities." But, as Murphy so aptly put it, "actually there is no longer such a thing as an 'extra-curricular' activity. If it is approved by the school department and a teacher is assigned to direct it, then it is a part of the curriculum."[14]

Another fundamental part of the formal teaching process is the supervision of study halls, playground activities, clubs, and assemblies, and participation in teacher meetings and conferences. Although these functions contribute less to the total load than do the classroom activities, still they are time-consuming and must be given due consideration.

The amount of time that the individual teacher must spend in cooperations is a function of the size of the organization. Schools having comparable missions support comparable activities. Therefore, the larger school has available a larger body of sponsors among whom these activities may be divided.

Clerical work. - The amount of clerical work associated with classroom activities increases in direct proportion with the class size; the attendance of each student must be recorded; the theses, exams, and other written work of each student must be corrected and evaluated. To a great extent, the amount of

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[14] Malcolm Price Murphy, "Teacher Load and Class Size in California Senior High Schools," (Unpublished Ed.D. dissertation, School of Education, Stanford University, 1940), 6.

clerical work required per pupil varies with the nature of the subject.

> Classes that involve daily or weekly paper grading as a fundamental part of the instructional method place a heavier sustained burden on the teacher than do classes in which paper grading is limited to a verification of learning through short quizes and, perhaps, a term paper.[15]

The amount of other clerical work required of the teacher varies with the type of organization. Without analysing these many and varied tasks, it would appear to be exceedingly inefficient to waste professional talent in tasks which could be performed adequately by lesser salaried clerks and typists.

Community and special services. - Traditionally, the teacher, the public servant, is expected to donate freely of his time and energies in the interests of community projects which fall within the range of his talents. To what extent should this practice flourish and how much should these activities contribute to the teacher's total load? This question remains unanswered.

Class size. - Previous discussions of class size have been limited to its effects on the time load with respect to individual instruction, preparation, and clerical work. Educators support the opinion that larger classes impose an additional load on the teacher, a psychological load which is a function of the number of teacher-pupil contacts. Since this factor has eluded reliable measurement, the practice has been

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[15] Luther H. Lyon, op. cit., 346.

to evaluate class size arbitrarily and to clamor for reductions. Houston called this factor the "teacher-pupil contact quotient" and suggested that it be measured by the following formula:

$$\frac{\text{Number of pupils met a week}}{\text{Number of times met a week}} \times \frac{\text{Total periods comprising teacher's weekly load}}{\text{Total number periods a week devoted to this group}} \quad [16]$$

The psychological factor associated with class size is attributed to many variables. In the opinion of educators, there is a high correlation between class size and discipline problems; Almack and Lang identified discipline as one of the most frequent causes of teacher failure.[17] It has been proposed that one should consider the heterogeneity of the pupils in the class; their ages, maturity, mentality, tractability, individual differences, the number of curricular offerings of the school, and the number of classes pupils may take. Consideration must be given to the physical conditions of the classroom; the seating capacity, lighting ventilation, etc. In brief, any condition which adversely affects the teaching process increases the mental and physical fatigue of the teacher.

Frequently it has been contended that, when classes become unduly large, the pupils learn less due to the inability of the teacher to accomodate individual student differences. Polls of teachers opinion have generally agreed that this

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[16] Percival W. Hutson, "A Neglected Factor in the Teaching Load," School Review, XL (March 1932), 193.

[17] John C. Almack and Albert R. Lang, *op. cit.*, 201

condition will exist when the class enrollment exceeds the magic number of thirty. However, this theory has been disproved through scientific research. Davis reported that class size has little or nothing to do with term grades.[10]

Nature of the subject. - There is general agreement that some subjects are more difficult to teach than others but there is no conclusive agreement concerning the relative difficulty. As a general rule, available lists of relative difficulty, or "subject coefficients", have been prepared from the solicited opinions of teachers and administrators who were asked to rate the difficulty of each subject in comparison with arbitrary standards, usually English composition. Table 1 presents, for purposes of comparison, a partial list of subject coefficients proposed by recognized authors. Although numerical comparison is difficult, a study of the rank order of subject difficulty illustrates the areas of agreement and disagreement.

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[10] C.O. Davis, op. cit., 412-29.

TABLE 1

A COMPARISON OF SUBJECT COEFFICIENTS PROPOSED BY AUTHORS CITED

Subject	Douglass[19]	Almack & Bursch[20]		Brown & Fritzemeier[21]	Tritt & Keyes[22]	Cole[23]
		Admin	Teachers			
English	1.1	1.0	1.0	1.0 -1.1	12.1	3.0-3.6
Science	1.1	.22	1.1	.84-1.23	11.2	4.2
History	1.1	.87	1.0	1.02-1.06	--	3.0-3.4
Social Stu.	1.1	--	--	.95-1.0	10.6	3.4
Geography	1.1	--	--	.83- .90	--	--
For. Lang.	1.0	.80	1.3	1.21-1.27	11.1	3.0
Comm. Subj.	1.0	.98	.81	.89-1.09	9.9	2.6-3.2
Math	1.0	.71	1.0	.96-1.14	10.8	3.4
Shop	.9	.56	.75	.85	8.7	4.0
Hschld Art	.9	.67	.65	.94- .96	9.0	4.0
Art	.9	.54	.9	.99	9.0	3.4
Music	.8	.60	.85	1.06	10.5	3.2
Phys. Ed.	.8	.46	.83	--	7.0-7.2	--
Study Hall	--	.45	.58	.74	7.0	--

Different instructional fields. - According to the theory of specialization, one can perform two related tasks with more skill and more ease than he can perform two unrelated tasks. The same reasoning may be applied to the teacher and the number of teaching fields assigned to him. How does the assignment

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[19] Harl R. Douglass, *op. cit.*, 117-18.

[20] John C. Almack and James F. Bursch, *The Administration of Consolidated and Village Schools*, 88.

[21] Edwin J. Brown and Louis H. Fritzemeier, *op. cit.*, 60.

[22] W.W. Tritt and Marion M. Keyes, "Estimating Teaching Loads by Means of Subject Coefficients," *Nation's Schools*, V (April 1930), 62.

[23] Thomas R. Cole, "Measuring Teacher Load in Secondary School Subjects," *American School Board Journal*, CXV (December 1947), 31.

of multiple teaching fields affect teacher load? Brown and Fritzemeier summarized the answers of twenty professors of a teachers college as follows:

Number of Separate Teaching Fields	Increased Difficulty %
1	0
2	12
3	34
4	75
5	155 [24]

Individual teacher differences. - The number of individual differences within a group is a multiple of the number of individuals in that group. Some of the more obvious differences which add to the teacher load are physical and mental health, ability as a teacher, temperament, and intelligence. The effect of these factors on the teacher load cannot be generalized; rather, each case must be decided on its own merit.

Teacher experience. - How does teacher experience with the teaching process affect his total load? Probably not as much as might be expected. Clubine concluded that the total load of inexperienced teachers was approximately 2% greater than that of experienced teachers and that experienced teachers carried heavier specially assigned loads and lighter extra-curriculum loads.[25] "Some principals assign a slightly lighter

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[24] Edwin J. Brown and Louis H. Fritzemeier, op. cit., 68.

[25] I. Ward Clubine, "Teacher Load in the Secondary Schools of Ontario," (Unpublished Ph. D. dissertation, New York University, 1944), 188, cited in Review of Educational Research, XVI No. 3 (June 1946), 259.

load to the beginning teacher than to the experienced teacher but that this advantage is probably offset on the whole by the tendency to assign beginning teachers a wider range of subjects to be taught."[26]

How does teacher experience with the subject affect his load? A new course places an increased burden on the teacher and that, unless this is recognized, the teacher is penalized for crawling out of his academic rut.[27] Koos found that first time work required considerably more total work than did work which had been done before.[28] A group of military instructors agreed that an average of 30 to 35 hours are required to prepare a one hour lecture on an academic subject for presentation the first time; approximately six hours of review and repreparation are required to repeat the subject in subsequent classes.[29]

Type of organization. - Since the other factors depend directly on the organization, the organization itself should be considered a factor of the load. The larger organization may reduce the individual teacher load with respect to such fixed functions as cooperations and community and special services assigned. At the same time, individual teacher differences may be slighted more in the larger organization.

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[26] Harl R. Douglass, op. cit., 111.

[27] Luther H. Lyon, op. cit., 346-7.

[28] L.V. Koos, op. cit., 39.

[29] Department of the Army, Survey of the Educational Program, The Adjutant General's School, Camp Lee, Virginia, May 1948, 34.

Probably the most important contribution of the organization toward increasing or decreasing the teacher load is the apparent consideration given the factors comprising teacher load and the resultant evenness of teacher assignments.

Summary

No one has professed to have published a complete list of factors comprising teacher load. No one has proved the relative contribution of each factor to the total teacher load although the conclusions of many educators and researchers tend to support each other. Perhaps the status of each factor is a function of the geographical location, of the school district, or of the school itself. Such a possibility is indicated by the non-agreement of opinion polls and surveys.

Class hours (classes/teacher) times class size (pupils/class) equals pupils/teacher. These were the first factors recognized as comprising teacher load. Undoubtedly their obviousness, ease of measurement, and dependability of measurement account, in part, for their continued popularity in definitions and formulas and for the perhaps excessive importance relegated to them. Recognition of these factors alone obviates consideration of the many other demands which may be and are placed on the teacher's time and energies. In the words of Hubbard,

> one of the most flagrant and persistent abuses in the field of school management has been, and is, the general expectation that each teacher will do just a little more than any one person can possibly do well.[30]

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[30] Frank W. Hubbard, "The Last Straw in Teacher Load," Secondary Education, VIII (November 1939), 264.

From the modern point of view, the equalization of class hours, or pupils per teacher, or pupil hours per teacher is not sufficient; rather, the total load of each teacher should equal the total load of every other teacher in the organization. In this respect, the total load of a teacher may be visualized as a non-compartmented capsule filled with three elements:

I. Direct time factor.
  A. Class hours.

II. Time factors associated with the teaching process.
  A. Preparation.
  B. Individual instruction.
  C. Cooperations.
  D. Clerical work.
  E. Community and special services.

III. Conditional factors.
  A. Class size.
  B. Nature of the subject.
  C. Different instructional fields.
  D. Individual teacher differences.
  E. Teacher experience.
  F. Type of organization.

The capsule cannot be filled beyond its capacity but the amount of any one element can be increased if, and only if, the amounts of the other elements are reduced proportionately.

B. How is Teacher Load Measured?

Since there is no conclusive agreement concerning the relative importance of each factor comprising teacher load, how can these factors be used to measure the load? Obviously no valid measurement is possible. Nevertheless, it is frequently desirable to measure teacher load for purposes of comparison or equalization. The measuring device to be used depends upon the philosophy of the user; his conception of

the relative value of each factor and his opinion regarding the validity of the device for measuring and inter-relating the factors.

Available measuring devices are of three types:

1. Objective, which considers only those factors which can be measured factually and mathematically; class hours, class size, and combinations thereof.
2. Subjective, which considers all factors and measures them by opinionation.
3. Combined objective-subjective, which considers all factors; factual factors are measured objectively and other factors are measured empirically.

Two Measuring Devices

Many formulas and methods of computing teacher load have been devised. Two are presented because of their representativeness; Almack-Bursch of the subjective methods; Douglass of the combined objective-subjective methods.

Almack and Bursch. - Almack and Bursch believed that the teaching load should be reasonably stable and should be adjusted to the teacher's ability. In their textbook (1925), they proposed that teacher load be measured in terms of weighted pupil-periods or pupil-hours by the following procedure:

1. Make a list of all the school and community activities in which the teachers will be expected to share.
2. Take a common activity, such as teaching thirty pupils English composition one hour (including the marking of papers), as a standard.
3. Call this standard one and have the teachers weight all the other activities in comparison with this standard.
4. Average all the weights assigned by the teachers to find what may be called the final subject weights.

5. Multiply the number of pupils a teacher has in every activity for which she is responsible by its subject weight and by the number of periods a week. Call this the subject load.
6. Add all the subject loads of each teacher to find the teaching load.[31]

Douglass. - Probably the most widely used formula was published by Douglass in 1932 and was later revised to include the use of subject coefficients. This formula measures the teacher load in terms of theoretical class periods per day or per week:

$$TL = SC\left[CP - \frac{2\,Dup}{10} + \frac{(NP - 20\,CP)}{100}\right]\left[\frac{PL + 55}{100}\right] \frac{PC}{2}\left[\frac{PL + 55}{100}\right]$$

TL - units of teaching load per week.
SC - subject coefficient.
CP - class periods spent in classroom per week.
Dup - number of class periods spent per week in classroom teaching classes for which the preparation is very similar to that for some other section, not including the original section.
NP - number of pupils in classes per week.
PC - number of class periods spent per week in supervision of the study hall, student activities, teacher meetings, committee work, assisting in administrative or supervisory work, or other cooperations.
PL - gross length in minutes of class periods.

The assumptions underlying the formula are as follows:

1. That in teaching two sections requiring practically identical preparation the amount of total work for the duplicate section in class and out is reduced approximately 20 percent if the quality of preparation is held constant.

2. That the additional teaching load resulting from large sections may be expressed in terms of the teaching load incidental to one section of average size by counting each 100 pupils met daily, in excess of an average load of 20 pupils per section as equal to the load resulting from teaching one section of average size.

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[31] John C. Almack and James F. Bursch, op. cit., 87.

3. That two class periods spent in cooperation are equivalent to teaching for one day one section requiring normal preparation.

4. That increasing the length of the class period by five minutes is equivalent to increasing the teaching load by one twentieth of a normal class with preparation for each period taught daily.[32]

Comparison of Some Measuring Devices

Newsom and Pollack analyzed and compared ten methods of measuring teacher load to determine their relative merits. They found that the desirability of each method varied according to the criterion used. Administrators tended to prefer those methods in which computation was simplified. Teachers preferred those methods which most nearly measured the load as they pictured it. However, when all data, other than that reflecting teacher opinion, was considered and the definition of teacher load as a measure of total load was the criterion, the Ward formula ranked first; the Almack-Bursch plan fifth; the Douglass (1932) formula seventh. The authors concluded that an objective method of computation was needed.[33]

Newsom and Pollack analyzed the ten methods with respect to nine general factors affecting teacher load and found that the Ward formula included the greatest number, 5; the Douglass and Almack-Bursch formulas each included 3.5

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[32] Harl R. Douglass, op. cit., 113-18.

[33] N. William Newsom and Richard S. Pollack, "Computing Teacher Load: Analysis and Comparison of Various Methods," School Review, XLVII (October 1939), 586-596.

factors.[34] Myers conducted an item analysis of nine methods with respect to eight specific items. He found that the Douglass (1932) formula included the greatest number, 7; whereas the Almack-Bursch formula ranked third with 4 items.[35]

Summary

To date, no method devised considers all factors comprising teacher load; no two give the same results. None of the methods is universally accepted.

Subjective methods are valid only for the group measured. Probably they can be used most advantageously in the area of intra-group comparison and equalization. The cry has been for an objective method, but purely objective methods now available consider the fewest number of factors. Consequently, the trend has been in the direction of methods involving empirical measurements. Generally, empirical standards of measurement are determined statistically, and facilitate inter-group comparisons.

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[34] *Ibid.*

[35] L.L. Myers, *op. cit.*

C. A Military Use for Knowledge of Teacher Load and Its Measurement.

The military schools also can use knowledge of teacher load and its measurement in the area of load comparison and equalization. But, even more important, this knowledge can be used to determine instructor allowances. Such a method has been devised and used in the Naval Air Technical Training Schools.

After considerable research and study of teacher load in the schools, the following conclusions were reached:

1. That no instructor should teach more than six hours per day; the average instructor requires a minimum of two hours per day for preparation and other work.
2. That, for formal class work, the student/instructor ratio should not exceed 25 or 30 to 1.
3. That, for shop, laboratory, and field training, the student/instructor ratio will approximate 6 to 1, but will vary.
4. That a supervisor must be assigned for every ten instructors.
5. That 25 percent of the instructor's time is unavailable to the teaching process due to:

Contingent unavailables (Sickness, emergency leave, etc.)	9 %
Annual Leave	8.2%
Professional Training	7.8%

Based on these conclusions, the following procedure was established to determine the instructor requirements of a course:

1. Divide the course into its phases of instruction.

2. For each phase, determine the number of hours allocated to each type of instruction and the student/instructor ratio applicable to that type of instruction.

3. Total the phase hours alloted to each student/instructor situation and apply the formula

$$\frac{\text{Input Quota x Situation Hours}}{\text{Student/Instructor Ratio}} = \text{Type Hours}$$

(Type hours represent the total number of instructor hours required by each student/instructor situation)

4. Total the type hours. Determine instructor requirements for a 30 hour instructional week per instructor by applying the formula

$$\frac{\text{Total type hours}}{\text{Frequency of Input x 30}}$$

5. Add 10% for supervisory requirements, and total to obtain the basic instructor requirement.

6. Divide the basic instructor requirement by 0.75 to obtain the total instructor requirement.[36]

This procedure is realistic in that it bases instructor assignments on the instructional time load of the school. Fundamentally, it is a more valid "yardstick" than that of student/instructor ratios used throughout the service. However it does not provide for many factors which are also part of the time load of the school and its basic assumptions are of limited applicability. The purpose of this study then was to apply this procedure to the problem of determining instructor allowances in all naval schools.

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[36] Technical Training Instruction - 7-TI-50, Chief of Naval Air Technical Training, Naval Air Station, Memphis, Tennessee, 27 February 1950.

CHAPTER IV

THE QUESTIONNAIRE

This study was premised on the theory that the instructor allowance for a naval school could be determined, with reasonable accuracy, from knowledge of the instructor load of that school. Since the computation of instructor allowances is a function of the Bureau of Naval Personnel and since problems of individual instructor differences must be solved locally, this study was concerned only with those factors of instructor load which are time consuming and which, therefore, can be measured objectively. These factors are 1) the formal instructional load, 2) the informal instructional load, 3) the instructional load imposed by administrative circumstances, and 4) the instructional load of contingent unavailables. This information was sought by means of a multipage questionnaire addressed to the senior administrator of each naval school listed under the planning cognizance of the Bureau of Naval Personnel.

The official military status of the author and the detailed nature of the questionnaire introduced the problem of eliciting suitable replies. It was believed that official identification might obviate adopting the viewpoints of the local administrators. Therefore, the questionnaire was forwarded with a letter emphasizing official sponsorship and official review of the results by the Bureau of Naval Personnel, but, at the same time, personal detachment.

For the most part, information requested was factual or readily estimatable. In a few instances, opinions were requested. Those opinions were known to have been previously formulated by many of the administrators.

The questionnaire was designed to simplify tabulation and was divided into six tables, each of which consisted of one or more pages depending upon the complicity of the individual school situations. The following information was requested:*

1. Table I, Curriculum Description.
   a. Course titles.
   b. Subject titles.
   c. Basic subject content.
   d. Percentage of course time allocated to each subject.
2. Table II, Student Load, July-December 1949.
   a. The quota for each course.
   b. The frequency with which classes convene.
   c. The actual number of students enrolled in each subject on the Monday of each week of the period indicated.
3. Table III, Subject Hours per Type of Instruction.
   a. For each subject, the number of hours spent in recitation, in lecture, etc.
4. Table IV, Student/Instructor Ratios.
   a. The number of students taught per instructor in each type of instruction for the period July-December 1949.
   b. Recommendations regarding the number of students to be taught per instructor in each type of instruction under desirable and maximum conditions.
5. Table V, Preparation Time (Hours).
   a. Opinion regarding the number of hours that the instructor should have available to prepare for

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*A copy of the questionnaire is included in the Appendix.

effective instruction in the types of instruction normally used in each subject.

6. Table VI, Instructor Activities.
    a. For an average week, a breakdown of factors comprising instructor load other than those of the formal load and preparation for the classroom presentation.
    b. Miscellaneous questions pertaining to the instructor load.

Response to the Questionnaire

Number mailed ----------------------------------	78
Number returned, completed ------------------	17
Number returned, partially completed -------	34
Number unanswered or returned unanswered ---	27

Replies were limited. Unfortunately, in many cases, the questionnaire was interpreted to be even more searching and detailed than had been intended. This interpretation inferred the need for extensive local research which administrators were reluctant to undertake. When this situation became known, it was necessary to moderate the original questionnaire. At this time, administrators were requested to remit completed tables and to complete Table VI if not previously done. At the same time, they were requested to remit available printed material which could be used in completing Tables I - III. Consequently, results received were in varying stages of completion.

CHAPTER V

ANALYSIS OF DATA

The questionnaire attempted to obtain data which would measure the expenditure of instructor time in four areas: 1) the formal load, 2) the informal load, 3) the load imposed by administrative circumstances, and 4) the load of contingent unavailables.

Although addressees were requested to comment freely on any part of the questionnaire, comparatively few comments were rendered thus indicating, perhaps, that the questionnaire items in themselves offered reasonable and adequate explanation.

Because of the small number of replies, the "B" and "C" schools were treated as one group, the functional and officer-technical schools as another. In the latter cases, this grouping was inevitable due to the dual nature of many of the schools.

A. The Formal Instructional Load

The formal instructional load of the instructor is his proportionate share of the school load. How many hours per week do instructors teach; how many should they teach? The present class hour loads of 697 instructors and the recommendations of 40 administrators are compared in Table 2. The majority (59%) of the administrators recommended that the load of their instructors be reduced from 18 to 15 hours;

34% recommended that it not be changed; 8% that it be increased from 3 to 5 hours.

TABLE 2

INSTRUCTOR CLASS HOUR LOAD
(Hours per Week)

	"A" Schools	"B" & "C" Schools	"P" & "OF" Schools	All Schools
		Present		
Mean Range	19.5 12-32	26.6 8-40	19.5 6-38	21.6 6-40
		Recommended		
Mean Range	18.6 14-24	23.2 12-40	17.5 6-38	19.6 6-40

Course hours. - The basic number of course hours to which the school is committed is determined by the formula given on page 15.

The typical school day reported consists of seven 50-minute periods, but variations are numerous. Of the 71 courses reported upon, 49 schedule 6 instructional hours per day; 70 schedule between 5 and 7 instructional hours per day. The number of periods per day ranges from 2 to 9; 6,7, and 8 are the most frequently used.

Class size. - Information regarding class size in 65 courses was reported. The pattern of class size with regard to the various types of instruction varied with each course. The maximum class recommended was 360 during lectures. For one or more types of instruction, it was reported that 33%

of the courses could accommodate maximum classes of 25 or 30; 24% in excess of 30; 43% less than 25.

In 8 courses, it was found that the average class size during the period ending December 31, 1949, exceeded the maximum recommended.

For purposes of this study, class size is of interest primarily because it indicates the limitations of the various types of instruction and the number of sections into which the enrolling class should be divided. To measure the effects of this division and to provide a means of inter-course comparison, the situations recommended for each course under desirable and maximum conditions of class size have been reduced to the common denominator of class hours (or instructor hours) per course hour and have been recorded in Tables 3 and 4. It can be seen that these tables are valuable tools in determining instructor allowances which are based on teaching time. The table to be used will depend upon acceptance of either desirable or maximum conditions of class size by the Bureau of Naval Personnel.

Computation of the entries in Tables 3 and 4 involved the following steps:

1. From Tables III and IV of the questionnaire, the number of course hours allotted to each recommended student/instructor ratio (class size) was determined.
2. Course hours in each category were reduced to a percentage of total course time (course hours per 100 hours of course time).
3. For each number of students considered (30, 25, etc.) the following formula was applied separately to all percentages:

   $$\text{Percentage} \times \frac{\text{No. of Stud.}}{\text{Class Size}} = \text{Class Hours or Instructor Hours}$$

   Fractions obtained were treated as whole numbers.

TABLE 3

INSTRUCTOR-HOURS PER COURSE-HOUR FOR DESIRABLE CONDITIONS OF CLASS SIZE

Course	Class	Number of Students				
		30	25	20	15	10
Construction Mechanics	B	12.67	11.02	8.49	6.72	4.50
Construction Electrician	B	6.72	5.98	4.43	3.67	2.31
Construction Draftsmen	B	6.63	5.56	4.42	3.35	2.21
Construction Surveyors	A	6.26	5.52	4.09	3.17	2.35
Construction Mechanic	A	6.12	5.54	3.96	3.27	2.27
Construction Drivers	B	6.08	5.47	4.02	3.12	2.35
Construction Draftsmen	A	5.77	4.80	3.67	2.90	1.97
Air Conditioning & Refrig.	C	5.36	5.24	4.12	3.12	2.12
Deep Sea Divers, Hel-Oxy	F	5.00	5.00	4.00	3.00	2.00
Advanced Undersea Weapons	F	4.95	4.24	3.25	2.54	1.71
Construction Drivers	A	4.69	4.30	3.37	2.45	1.85
Construction Utility Men	B	4.23	4.23	3.23	2.53	1.70
Construction Utility Men	A	4.14	4.14	3.14	2.47	1.67
Construction Steelworkers	B	4.11	4.11	3.11	2.48	1.66
Construction Steelworkers	A	4.08	4.08	3.08	2.44	1.64
Electrician's Mates	A	3.87	3.59	2.59	2.31	1.29
Construction Builders	B	3.59	3.44	2.64	2.12	1.32
Construction Electricians	A	3.50	2.95	2.49	1.83	1.37
*Enginemen	A	3.39	3.08	2.60	1.87	1.26
IC Electricians	A	3.36	3.24	2.24	2.12	1.12
Construction Builders	A	3.36	3.09	2.40	2.09	1.27
Salvage	O-T	3.31	3.10	2.49	1.73	1.56
Deep Sea Divers	F	3.00	3.00	2.00	2.00	1.00
Enginemen	C	3.00	3.00	2.00	2.00	1.00
Yeomen	A	3.00	3.00	2.00	2.00	1.00
Motion Picture Operators	C	2.60	2.46	1.93	1.46	1.14
*Personnelmen	A	2.49	2.49	1.50	1.49	1.00
Salvage	F	2.14	2.14	1.62	1.14	1.00
Radiomen	A	2.08	1.44	1.39	1.11	1.03
Fire Control Technician	B	2.02	2.00	1.96	1.02	1.00
Fire Control Technician	A	2.00	2.00	1.03	1.00	1.00
Fire Control Tech., Mk 56	B	2.00	2.00	2.00	1.00	1.00
Telemen	A	1.71	1.63	1.41	1.01	1.00
IC Electricians	B	1.35	1.35	1.31	1.04	1.01

*Average of two reports.

TABLE 4

INSTRUCTOR-HOURS PER COURSE-HOUR FOR MAXIMUM CONDITIONS OF CLASS SIZE

Course	Class	Number of Students				
		30	25	20	15	10
Construction Mechanic	B	6.95	6.18	4.41	3.53	2.05
Construction Drivers	B	4.36	4.19	3.06	2.39	1.61
Deep Sea Divers, Hel-Oxy	F	4.00	4.00	3.00	2.00	2.00
Construction Mechanic	A	3.96	3.96	3.27	2.27	1.69
Electrician's Mates	A	3.87	3.30	2.59	2.51	1.28
Adv. Under-Sea Weapons	F	3.83	3.42	2.65	2.17	1.41
Construction Surveyors	A	3.75	3.75	2.99	2.32	1.66
Construction Draftsmen	B	3.71	3.52	2.45	2.26	1.22
Construction Drivers	A	3.63	3.24	2.32	2.06	1.39
IC Electricians	A	3.36	3.24	2.24	2.12	1.12
Construction Electrician	B	3.32	3.32	2.76	1.76	1.56
Construction Draftsmen	A	3.30	3.16	2.15	2.01	1.15
Air Conditioning & Refrig.	C	3.04	3.04	2.04	1.92	1.12
Deep Sea Divers	F	3.00	3.00	2.00	2.00	1.00
Enginemen	C	3.00	3.00	2.00	2.00	1.00
Construction Utility Men	A	2.75	2.75	1.75	1.75	1.00
Construction Electricians	A	2.72	2.17	1.92	1.42	1.37
Construction Steelworkers	A	2.70	2.70	1.70	1.70	1.00
Construction Utility Men	B	2.58	2.58	1.70	1.76	1.00
Yeomen	A	2.54	2.54	2.00	1.54	1.00
Construction Steelworkers	B	2.50	2.50	1.72	1.72	1.00
Construction Builders	B	2.22	2.22	1.90	1.14	1.09
Salvage	C-T	2.07	2.00	1.44	1.07	1.00
Construction Builders	A	2.05	2.05	1.85	1.06	1.00
Fire Control Technician	B	2.02	1.97	1.04	1.02	1.00
Fire Control Technician	A	2.00	1.40	1.03	1.03	1.00
Fire Control Tech., Mk 56	B	2.00	2.00	1.38	1.00	1.00
Motion Picture Operators	C	1.95	1.93	1.15	1.14	1.00
*Enginemen	A	1.86	1.74	1.26	1.13	1.07
Salvage	F	1.62	1.34	1.07	1.00	1.00
Telemen	A	1.55	1.55	1.17	1.01	1.00
*Personnelmen	A	1.50	1.50	1.49	1.00	1.00
IC Electricians	B	1.30	1.30	1.30	1.00	1.00
Radiomen	A	1.00	1.00	1.00	1.00	1.00

*Average of two reports.

4. Instructor hours were totaled and divided by 100 to yield instructor hours per course hour.

Either Table 3 or 4 may also be used to plan student enrollment efficiently. A coefficient of efficiency may be obtained by dividing the number of students by the corresponding instructor hours per course hour, the largest coefficient denotes the greatest number of students that can be taught by the least number of instructors. Also, the table used can answer a question of considerable importance; what are the most efficient increments of student population? This answer is indicated by recurrence of the largest coefficient. For example, in the Enginemen, Class "C", Course (Table 4) the coefficient is largest at student populations of 30, 20, and 10. In addition these tables can be used in the area of quota control by noting the effect, on instructor load, of enrollments in excess of quotas. Coefficients determined from these tables are applicable only to their respective courses and are not subject to inter-course comparison.

Class enrollment. - Data pertaining to class enrollment was obtained from Table II of the questionnaire.

It was apparent that, during the period reported, the established quota for a course was not a reliable predictor of the size of the class enrolled. For the courses reported upon, the ratio of average class enrollment to quota is shown in Table 5.

Perhaps the large number of Class "A" schools with average enrollments exceeding their respective quotas indicates the fleet demand for trained apprentices during the period

reported and the lesser enrollments in the other schools indicates the relative unavailability of fleet personnel for training.

TABLE 5

RELATION OF CLASS ENROLLMENT TO QUOTA
(July - December, 1949)

Ave. Enroll. / Quota	Number of Courses		
	"A" Schools	"B" & "C" Schools	"F" & "O-T" Schools
0.0 - 0.99	7	15	9
1.0 - 1.999	8	2	0
2.0 - 2.999	0	0	0
3.0 - 3.999	1	0	0
N	16	17	9

B. The Informal Instructional Load

Preparation for classroom presentation. - Must a new lesson plan be prepared for each class period or are lesson plans reusable? Of the 68 courses reported, lesson plans are reusable in 65; 25% reusable in 2 functional courses; not reusable in one officer-technical course. This indicates that preparation time required is near a minimum.

How much time is required to prepare for an hour of recitation, for an hour of lecture, etc.? Also, how much of the course time is consumed in each type of instruction? The answers to these questions are not pertinent to the objective of this study and are not considered here. However, the recommendations received have been summarized in Tables 19 and 20 located in the Appendix.

For each course, information obtained from Tables III and V of the questionnaire was reduced to the preparation time recommended per course hour. With reference to Table 6, the similarity of preparation requirements for Class "A", "B", and "C" courses is apparent; as recommended, the average hour of instruction in these courses requires approximately one-half hour of preparation. This figure is compatible with the findings of civilian research.[*]

Preparation time recommended for "functional" and "officer-technical" courses is somewhat greater. Because of the small number of replies pertaining to these courses, the courses have been identified in Table 6. On the basis of this meager data, it appears that preparation time for "functional" courses approximates that for "A", "B", and "C" courses, whereas the officer-technical courses require in the vicinity of one or one and one-half hours per course hour (the means are 0.40 and 1.64 respectively). However these measures cannot be considered reliable because of the small sample obtained.

Preparation and revision of lesson plans. - Table 7 gives the number of hours per week that instructors devote to the preparation and revision of lesson plans.

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[*] Newsom and Pollack[1] found that the Ward formula best measured teacher load both as defined and as the teachers saw it. This formula allowed 20 minutes for each separate preparation.

[1] N. William Newsom and Richard S. Pollack, "Computing Teacher Load: Analysis and Comparison of Various Methods," School Review, XLVII (October, 1939), 586-96.

TABLE 6

DISTRIBUTION OF RECOMMENDED PREPARATION TIME PER COURSE HOUR

Interval (Hours)	Number of Courses			
	"A" Schools	"B"&"C" Schools	"F"&"O-T" Schools	All Schools
0.00 - 0.24	3	4	...	7
0.25 - 0.49	6	8	1 (F)	15
0.50 - 0.74	5	1	1 (F)	7
0.75 - 0.99	3	1	...	4
1.00 - 1.24	1	...	...	1
1.25 - 1.49	...	...	1 (O-T)	1
1.50 - 1.74	...	...	...	...
1.75 - 1.99	...	...	1 (O-T)	1
2.00 - 3.00	...	1	...	1
N	18	15	4	37
*Mean	0.57	0.49	1.02	0.58

*From raw data.

TABLE 7

DISTRIBUTION OF INSTRUCTOR LOAD

- PREPARATION AND REVISION OF LESSON PLANS -

(Hours per week per instructor)

Interval (Hours)	Number of Instructors			
	"A" Schools	"B"&"C" Schools	"F"&"O-T" Schools	All Schools
0.00 - 0.49	122	38	20	180
0.50 - 0.99	9	...	...	9
1.00 - 1.49	42	...	5	47
1.50 - 1.99	18	...	17	35
2.00 - 2.49	22	22	30	74
2.50 - 2.99	32	28	...	60
3.00 - 3.49	...	7	...	7
3.50 - 3.99	...	...	...	...
4.00 - 4.49	129	12	...	141
4.50 - 4.99	...	...	...	...
5.00 - 5.49	14	24	5	43
N	388	131	77	596
Mean	2.27	2.56	1.75	2.26
Std. Dev.	1.76	1.78	1.22	1.72

It is noted that this activity requires less time in the "F" and "C-F" schools than in the other schools. On the other hand, the situation is reversed with respect to preparation for classroom presentation. Possibly this comparison is indicative of less stable, less permanent lesson plans in the "F" and "C-F" schools.

Design, manufacture, and repair of training aids. - Table 8 gives the number of hours per week that instructors are designing, manufacturing and repairing training aids. Assuming that each school has been given equal consideration with regards to the assignment of shop personnel, it appears that the "B" and "C" schools either use more training aids or that those used require more attention.

TABLE 8

DISTRIBUTION OF INSTRUCTOR LOAD
- DESIGN, MANUFACTURE, AND REPAIR OF TRAINING AIDS -
(Hours per Week per Instructor)

Interval (Hours)	Number of Instructors			
	"A" Schools	"B"&"C" Schools	"F"&"C-F" Schools	All Schools
0.00 - 0.49	134	42	76	252
0.50 - 0.99	207	...	...	207
1.00 - 1.49	58	57	57	172
1.50 - 1.99	20	...	...	20
2.00 - 2.49	9	44	...	53
2.50 - 2.99	...	...	...	...
3.00 - 3.49	6	33	12	51
Total	434	176	145	755
Mean	0.77	1.64	0.89	1.00
Std. Dev.	0.54	1.07	0.85	0.83

Attention given the individual student. - Inspection of Tables 9 and 10 reveals similar patterns of instructor employment in the areas of individual instruction and student conferences and interviews. It is noted that these activities are more pronounced in the "B" and "C" schools than in any of the others. This situation might be explained by the function of these schools in qualifying the students for promotion.

TABLE 9

DISTRIBUTION OF INSTRUCTOR LOAD
- INDIVIDUAL INSTRUCTION -
(Hours per Week per Instructor)

Interval (Hours)	Number of Instructors			
	"A" Schools	"B""P""C" Schools	"F""S""O-T" Schools	All Schools
0.00 - 0.49	320	87	118	535
0.50 - 0.99	9	...	...	9
1.00 - 1.49	51	15	9	75
1.50 - 1.99	...	...	...	...
2.00 - 2.49	29	30	...	59
2.50 - 2.99	...	...	5	5
3.00 - 3.49	32	28	13	73
3.50 - 3.99	...	...	...	...
4.00 - 4.49	...	12	...	12
N	441	172	145	758
Mean	0.71	1.44	0.67	0.87
Std. dev.	0.88	1.37	0.95	1.09

TABLE 10

DISTRIBUTION OF INSTRUCTOR LOAD
- STUDENT CONFERENCES AND INTERVIEWS -
(Hours per Week per Instructor)

Interval (Hours)	Number of Instructors			
	"A" Schools	"B"&"C" Schools	"T"&"O-T" Schools	All Schools
0.00 - 0.49	248	109	123	480
0.50 - 0.99	79	...	...	79
1.00 - 1.49	60	7	13	80
1.50 - 1.99	...	...	...	...
2.00 - 2.49	46	40	...	86
2.50 - 2.99	...	...	...	...
3.00 - 3.49	8	7	9	24
3.50 - 3.99	...	...	...	...
4.00 - 4.49	...	...	...	...
4.50 - 4.99	...	...	...	...
5.00 - 5.49	...	13	...	13
N	441	176	145	762
Mean	0.74	1.23	0.53	0.81
Std. dev.	0.75	1.48	0.63	1.00

C. The Instructional Load Imposed by Administrative Circumstances

Supervision of Student Activities. - Although 11 of the 56 schools reported that instructors were not required to supervise student activities, Table 11 indicates that this duty is an accepted part of the average instructor's work week. Student activities included in the comments of administrators were athletic periods, evening study periods, military drills, and housekeeping activities.

Clerical work. - The clerical load is of universal concern in the schools. The range of distribution depicted in Table 12 indicates its variable nature and, therefore, its dependence on the number of clerical personnel assigned.

TABLE 11

DISTRIBUTION OF INSTRUCTOR LOAD
- SUPERVISION OF STUDENT ACTIVITIES -
(Hours per Week per Instructor)

Interval (Hours)	Number of Instructors			
	"A" Schools	"B"&"C" Schools	"P"&"O-T" Schools	All Schools
0.00 - 0.49	112	45	71	228
0.50 - 0.99	23	40	...	63
1.00 - 1.49	96	39	...	135
1.50 - 1.99	26	...	...	26
2.00 - 2.49	23	26	...	49
2.50 - 2.99	...	...	...	...
3.00 - 3.49	138	13	9	160
3.50 - 3.99	...	...	...	...
4.00 - 4.49	23	13	52	88
N	441	176	132	749
Mean	1.83	1.40	2.05	1.77
Std. dev.	1.51	1.19	1.93	1.45

TABLE 12

DISTRIBUTION OF INSTRUCTOR LOAD
- CLERICAL WORK -
(Hours per Instructor per Week)

Interval (Hours)	Number of Instructors			
	"A" Schools	"B"&"C" Schools	"P"&"O-T" Schools	All Schools
0.00 - 0.49	25	38	17	80
0.50 - 0.99	17	...	31	48
1.00 - 1.49	189	77	...	266
1.50 - 1.99	...	12	...	12
2.00 - 2.49	73	...	94	167
2.50 - 2.99	...	...	...	...
3.00 - 3.49	50	21	...	71
3.50 - 3.99	...	...	...	...
4.00 - 4.49	41	28	3	72
4.50 - 4.99	...	...	...	...
5.00 - 5.49	14	...	...	14
5.50 - 5.99	9	...	...	9
6.00 - 6.49	23	...	...	23
N	441	176	145	762
Mean	2.33	1.70	1.74	2.09
Std. dev.	1.61	1.38	0.87	1.46

For example, one administrator commented that it was impossible for his one yeoman to prepare all reports required and to keep up-to-date the lesson plans of the school's seven courses.

Maintenance and repair of school equipment. - As shown in Table 13, the maintenance and repair load of "P" and "O-T" school instructors is relatively light. This may be indicative of more favorable consideration with regard to the assignment of maintenance personnel. In commenting on this phase of the load, one administrator reported that his instructors were assigned responsibilities for the maintenance of station equipment.

TABLE 13

DISTRIBUTION OF INSTRUCTOR LOAD
- MAINTENANCE AND REPAIR OF SCHOOL EQUIPMENT -
(Hours per Week per Instructor)

Interval (Hours)	Number of Instructors			
	"A" Schools	"B"&"C" Schools	"P"&"O-T" Schools	All Schools
0.00 - 0.49	76	54	125	255
0.50 - 0.99	6	...	...	6
1.00 - 1.49	39	19	5	63
1.50 - 1.99	...	...	...	...
2.00 - 2.49	94	38	...	132
2.50 - 2.99	...	21	...	21
3.00 - 3.49	144	18	...	162
3.50 - 3.99	32	...	...	32
4.00 - 4.49	9	...	15	24
4.50 - 4.99	41	...	...	41
5.00 - 5.49	...	26	...	26
N	441	176	145	762
Mean	2.50	2.13	0.70	2.08
Std. dev.	1.37	1.66	1.22	1.56

Logistic activities and collateral duties. - Considered separately, Tables 14 and 15 show wide variations of load among the types of schools. However, the sum of the means of these phases is considerably less variable; 2.00 for the "A" schools, 1.73 for the "B" and "C" schools, and 2.27 for the "P" and "C-T" schools. This situation suggests a fine line of interpretive distinction between the two areas.

Administrators were asked to list the collateral duties performed by instructors. Many included military watches performed outside of school hours. Where this situation was apparent, time so indicated was deducted from the total time of collateral duties.

Instructors were reported to be assigned collateral responsibilities in the following areas:

1. At the level of the naval district.
    a. Planning boards.
    b. Liason with units of the Army and Air Force.
2. At the station level.
    a. Coordinated campaigns for funds; Red Cross, Savings Bonds, etc.
    b. Welfare and recreation; Recreation Council and Committee, entertainment movies, etc.
    c. Courts martial and boards of investigation.
    d. Liason with the community.
    e. Special boards and committees; auditing, physical evaluation, etc.
    f. Education; Armed Forces Institute programs, etc.
3. At the school level.
    a. Curriculum control; preparation of text book, technical class problems, etc.
    b. Coordination of supply and transportation functions.
    c. Control of publications and classified material.
4. Military duties.
    a. Small arms equalifications.
    b. Watches during school hours.
    c. Supervision of military units.

TABLE 14

DISTRIBUTION OF INSTRUCTOR LOAD
- LOGISTIC ACTIVITIES -
(Hours per Week per Instructor)

Interval (Hours)	Number of Instructors			
	"A" Schools	"B"&"C" Schools	"F"&"G-T" Schools	All Schools
0.00 - 0.49	292	94	75	461
0.50 - 0.99	9	21	...	30
1.00 - 1.49	106	40	15	161
1.50 - 1.99	...	...	...	...
2.00 - 2.49	...	...	...	...
2.50 - 2.99	...	...	...	...
3.00 - 3.49	...	21	52	73
N	407	176	145	738
Mean	0.52	0.90	1.48	0.80
Std. dev.	0.44	0.96	1.40	0.92

TABLE 15

DISTRIBUTION OF INSTRUCTOR LOAD
- COLLATERAL DUTIES -
(Hours per Week per Instructor)

Interval (Hours)	Number of Instructors			
	"A" Schools	"B"&"C" Schools	"F"&"G-T" Schools	All Schools
0.00 - 0.49	169	94	68	331
0.50 - 0.99	35	36	...	71
1.00 - 1.49	29	11	52	92
1.50 - 1.99	...	21	...	21
2.00 - 2.49	158	...	...	158
2.50 - 2.99	...	...	...	...
3.00 - 3.49	...	14	...	14
3.50 - 3.99	25	...	...	25
4.00 - 4.49	...	...	...	...
4.50 - 4.99	...	...	...	...
5.00 - 5.49	16	...	3	19
N	432	176	123	731
Mean	1.48	0.83	0.79	1.21
Std. dev.	1.30	0.86	0.86	1.19

D. The Instructional Load of Contingent Unavailables

In-service training. - The instructor gains in proficiency through in-service training. In order to measure the progress of the new instructor, administrators were asked to estimate the number of weeks required to attain stated degrees of proficiency. Their replies are summarized in Table 16. The magnitude of this problem is more impressive when the length of the instructor's tour of duty is considered. For example, the hypothetically average instructor does not attain 100% proficiency until the end of the 30th week of his 104 to 130 weeks of duty. Also, it must be borne in mind that, in administrative opinion, approximately one-third of the instructors never attain 100% proficiency.

TABLE 16

INSTRUCTOR PROFICIENCY

Schools	Mean Weeks to Attain Degree of Proficiency Indicated				% of Instructors Who Never Attain 100% Proficiency
	25%	50%	75%	100%	
"A"	4.05	10.00	19.80	35.70	32.6
"B"&"C"	5.15	7.80	19.00	25.00	46.5
"P"&"O-T"	3.86	8.25	10.00	22.15	25.3
All	4.25	9.28	17.83	29.80	35.0
Range	0-12	0-28	3-70	4-Never	0-100

The extent of the in-service training programs prosecuted in the schools is depicted in Table 17. Here it is seen that a slightly more rigorous program is supported in the "A" schools where the proficiency attainment rate (Table 16) is slower; an opposing situation exists in the "B" and "C" schools It may be hypothesized that, in the "P" and "O-T" schools, the

proficiency attainment rate is speeded by a comparatively more extensive in-service training program.

TABLE 17

DISTRIBUTION OF INSTRUCTOR LOAD - IN-SERVICE TRAINING -

(Hours per Week per Instructor)

Interval (hours)	Number of Instructors			
	"A" Schools	"B"&"C" Schools	[illegible] Schools	All Schools
0.00 - 0.49	75	67	59	201
0.50 - 0.99	24	10	...	34
1.00 - 1.49	47	39	29	115
1.50 - 1.99	25	...	...	25
2.00 - 2.49	235	47	5	287
2.50 - 2.99	18	...	...	18
3.00 - 3.49	17	13	52	82
N	441	176	145	762
Mean	1.75	1.26	1.60	1.61
Std. dev.	0.86	0.98	1.32	1.00

Absence due to sickness. - Sickness is a function of the individual rather than of the school. Therefore, the distribution shown in Table 18 is of little use for inter-school comparison. However, the means obtained indicate the existence of this portion of the load and the need for its inclusion in the total load.

Absence for disciplinary reasons. - Only one school reported instructor absence for disciplinary reasons. Therefore, it may be concluded that such absences are negligible and need not be considered a part of the load.

Absence due to leave. - As previously stated, the instructor is legally entitled to lave amounting to 3.08 hours per week.

TABLE 18

DISTRIBUTION OF INSTRUCTOR LOAD
- SICKNESS -
(Hours per Week per Instructor)

Interval (Hours)	Number of Instructors			
	"A" Schools	"B"&"C" Schools	"P"&"O-T" Schools	All Schools
0.00 - 0.49	380	136	59	575
0.50 - 0.99	...	...	20	20
1.00 - 1.49	61	28	61	150
1.50 - 1.99	...	...	5	5
2.00 - 2.49	...	12	...	12
N	441	176	145	762
Mean	0.39	0.55	0.79	0.50
Std. dev.	0.34	0.59	0.40	0.47

E. Summary

Assuming that the time presently devoted to preparation for the classroom presentation equals that recommended, the present mean instructor load in hours per week may be summarized as follows:

	"A" Schools	"B"&"C" Schools	"F" Schools	"O-T" Schools	All Schools
Formal Load	19.50	26.60	19.50	19.50	21.60
Informal Load Prep. for Class*	11.12	13.03	7.80	19.50**	12.53
Sub-total	30.62	39.63	27.30	39.00	34.13
Informal Load Others	4.49	6.37	3.84	3.84	4.94
Admin. Load	8.66	7.05	6.74	6.74	7.95
Unavailables	5.22	4.80	5.47	5.47	5.19
Sub-total	18.37	18.81	16.05	16.05	18.08
Total	48.99	58.44	43.35	55.05	52.21

*Preparation time per course hour times formal load.

**Assuming preparation time equals one hour per course hour.

If the reductions in formal load recommended by administrators (Table 2) were incorporated, the load would be as follows:

	"A" Schools	"B"&"C" Schools	"F" Schools	"O-T" Schools	All Schools
Formal Load	18.60	23.20	17.50	17.50	19.60
Informal Load Prep. for Class	10.60	11.37	7.00	17.50	11.37
Sub-total	29.20	34.57	24.50	35.00	30.97
Others	18.37	18.81	16.05	16.05	18.08
Total	47.57	53.38	40.55	51.05	49.05

CHAPTER VI

A SOLUTION TO THE PROBLEM

For purposes of determining instructor allowances, it appears desirable to first establish the total work week required of the instructor and then to adjust the factors of his load accordingly. If 40 hours (the normal work week of other naval personnel) is accepted as the criterion, the adjustment should be downward.

It is apparent that the formal load remains the principle time consuming factor and that minimum instructor allowances are required when the class hours per instructor are at a maximum consistent with sound educational practice and with the other factors of the load. Therefore, the reductions should be sought in other areas.

The informal load is a function of the formal load; the number of lesson plans, preparations, training aids, and students in the instructor's sphere of responsibility. Probably the load of contingent unavailables is the least reducable; leave and sickness are not subject to administrative control; Table 16 emphasises the need for in-service training time included. However, only a small portion of the present load imposed by administrative circumstances is directly related to the teaching process. Therefore, reductions in this area appear to be most feasible.

Consider the total load now to consist of two sections: 1) the formal load, including class preparations, and 2) the load of all other factors. If the administrative load were to be eliminated completely, section 2 would total approximately 10 hours per week. This suggests that a formal load of 30 hours per week is the maximum attainable.

Assume that each class hour requires one-half hour of preparation in the "A", "B", "C", and functional schools; one hour in the officer-technical schools. Thus, each "A", "B", "C", and functional school instructor should be assigned a formal load of 20 hours per week; the officer-technical school instructor 15 hours per week. This division of the instructor's work week is in agreement with sound educational theory.[1]

Therefore, the following formulas are offered:

1. For a course in a Class "A", "B", "C", or functional school.

$$I = \frac{35}{20} \times \frac{LC}{FC} \times IH$$

2. For a course in an officer-technical school.

$$I = \frac{35}{15} \times \frac{LC}{FC} \times IH$$

The instructor allowance for the school then equals the sum of the allowances for all courses.

I - number of instructors.
LC - length of the course in weeks.
FC - frequency with which the course convened, in weeks.
IH - instructor hours per course hour (from Table 3 or 4, whichever conditions are adopted).

The above formulas are based on the following assumptions:

---

[1] *Supra*, 30.

1. That the instructor's total work week should equal 40 hours.

2. That the length of the school week is 35 hours.

3. That the instructor's formal load should approximate 20 hours per week in "A", "B", "C", and "F" schools; 15 hours per week in "O-T" schools.

4. That the instructor's informal load of preparation for one hour of classroom presentation should approximate one-half hour in "A", "B", "C", and "F" schools; one hour in "O-T" schools.

5. That the instructor's load of all other factors should approximate 10 hours per week and that this standard can be realized primarily through reduction of the instructional load imposed by administrative circumstances.

CHAPTER VII

CONCLUSIONS

The student/instructor ratio is an invalid "yardstick" for determining the instructor allowances of naval service schools. Its use erroneously implies that the instructor is assigned to the school solely for the purpose of tutoring a given number of students. Instead, the instructor load is composed of many factors which may be grouped into two categories: 1) direct time consuming factors and 2) conditional factors of individual differences and subject variations. No arbitrary variation of the student/instructor ratio used can accurately provide for all these factors. Only that "yardstick" which considers all factors will be valid.

Instructor allowances established by the Bureau of Naval Personnel can provide only for the direct time consuming factors comprising instructor load. Ideally, this could be accomplished most accurately by providing for the conditions existing in each school. However, such a procedure applied to all factors would soon prove to be unacceptably burdensome. So, for practical purposes, it would seem more appropriate to establish, for each group of schools, a standard, formal instructor load and to assign instructors accordingly. Determination of these standard loads has been the primary objective of this study; loads determined have been embodied in the basic assumptions pertaining to the formulas presented.

The formulas presented in Chapter VI rival the student/instructor ratio in simplicity of use. Their adoption requires

the acceptance of the underlying assumptions which have been based on common practice, sound educational theory, and measures obtained by this study.

Knowledge of the number of instructor hours required per course hour (Tables 3 and 4) is an invaluable tool for use in determining instructor allowances, planning course quotas, and controlling student enrollments. These tables should be expanded to include every course in the naval training program.

The complicated structure of the school's class schedule may not permit application of the standard load to each instructor. However, the standard should be used as a model. By understanding the construction of the model, the individual school administrator should be better equipped to satisfactorily equalize the loads of his instructors. In this respect, he should review the non-classroom loads to ensure that they total no more than is allotted by the instructor allowances of the school.

Similarly, the conditional factors of individual differences and subject variations should contribute to load equalization at the school or station level. Undoubtedly individual differences can best be recognized and provided for at the school level. However, equalization of loads with respect to the relative difficulty of subjects might well be undertaken as a station project. In order to facilitate the understanding of these factors, a summary or, perhaps, a bibliography of civilian research in these areas should be prepared for the use of school administrators. Chapter III and the Bibliography of this study could be used as the basis for that information.

Recommendations for Further Study

Tables 3 and 4 show that the variable of class size is not a function of school classification but, rather, that courses tend to be grouped by similarity of subject matter. This suggests that other factors of instructor load might be less variable if analysed with respect to these groups of related courses.

The instructor load imposed by administrative circumstances and that concerned with training aids depend, to a great extent, upon the number of clerical and maintenance personnel available to the school. Therefore, the need for a corollary study of clerical and maintenance personnel allowances is indicated.

APPENDIX

REFERENCE MATERIAL

TABLE 19

MEAN PREPARATION TIME PER HOUR OF INSTRUCTION BY TYPE OF INSTRUCTION (Hours)

Type of Instruction	"A" Schools	"B"&"C" Schools	"F"&"O-T" Schools	All Schools
Recitation	0.55	0.47	1.08	0.68
Lecture	0.77	0.63	1.66	0.85
Lecture, Film	0.68	1.14	2.37	1.04
Lecture, Demonstration	0.85	0.63	1.55	0.88
Lecture, Practical	0.80	0.72	1.54	0.89
Directed Discussion	0.58	0.61	3.06	0.85
Practical	0.42	0.45	1.49	0.60
Supervised Study	0.46	0.50	0.98	0.61
Exam	1.72	1.55	1.69	1.65

TABLE 20

USE OF VARIOUS TYPES OF INSTRUCTION IN NAVAL SCHOOLS

Type of Instruction	Courses Using (%)	Mean Time (% of Course where used.)
Recitation	34.6	4.57
Lecture	90.4	25.30
Lecture, Film	84.6	3.69
Lecture, Demonstration	34.6	7.70
Lecture, Practical	76.8	7.53
Directed Discussion	73.1	6.65
Seminar	11.5	2.83
Practical	100.0	41.80
Supervised Study	50.0	5.73
Exam	100.0	6.38

c/o Professor of
Naval Science
Stanford University
Stanford, Calif.
7 February 1950

Officer-in-Charge
U.S. Naval School, ____________
____________________ , ____________

Dear Sir,

During my recent tour of duty as Officer-in-Charge of a naval school, I was deeply impressed with the universal concern of school administrators for the problem of unsatisfactory instructor allowances. Under the sponsorship of the Bureau of Naval Personnel, I am conducting a survey of this situation. In order that I may include all elements of the problem, including those of your school, I am soliciting your assistance, Please complete the enclosed questionnaire and return it to me by 1 March 1950 or as soon thereafter as possible.

I plan to compute instructor allowances on the basis of the total number of instructor-hours required of the school per week. This study will consider 1) all activities of instructors during school hours, 2) all instructional activities of instructors outside of school hours, and 3) all instructional activities of supervisory and maintenance personnel. This study will not consider such items as military duties performed outside of school hours.

Please comment freely on the information requested herein and include any additional information which you consider pertinent to the problem.

The results of this study will be reviewed in the Bureau of Naval Personnel. I sincerely hope that our efforts in behalf of this survey will be rewarded by favorable action.

Very truly yours,

C.C. Dickes
LCDR, USN

TABLE I. CURRICULUM DESCRIPTION

Directions: 1. List all courses and subjects.
2. Course and subject designators assigned here will be used throughout the questionnaire to avoid repeating lengthy titles. Assign designators as follows:
Course # - Roman numerals
Subject # - capital letters.
3. Under SUBJECT CONTENT, indicate the component basic subject matter (i.e. trignometry, basic electricity, advanced electricity, typing, etc.) and the percentage of time devoted to each.
4. If the information requested under SUBJECT CONTENT is available in other form, such as the subject outline, attach that form and omit that part of the table.

COURSE		SUBJECT		SUBJECT CONTENT	
#	Title	#	Title	Subject Matter	%

TABLE II. STUDENT LOAD. July-December 1949

Directions: 1. List all courses and subjects.
2. Indicate actual number of students enrolled on dates indicated.

CSE #	SUBJ #	QUOTA		JULY				AUGUST					NOVEMBER				DECEMBER			
		#	FREQUENCY	4	11	18	25	1	8	15	22	29	7	14	21	28	5	12	19	26

TABLE III. SUBJECT-HOURS PER TYPE OF INSTRUCTION

Directions: 1. List all subjects.
2. For each subject, indicate the number of hours spent in each type of instruction normally used in that subject.

SUBJ #	TYPE OF INSTRUCTION										
	Recitation	Lecture	Lecture-Film	Lecture-Demonstration	Lecture-Practical	Directed Discussion	Seminar	Practical	Supervised Study	Exam	Total Hours

TABLE IV. STUDENT/INSTRUCTOR RATIOS

Directions: 1. List all subjects.

2. For each subject, indicate the number of students taught per instructor or the number recommended to be taught per instructor under the following conditions:

   A - Average, July-December 1949
   D - Desirable
   M - Maximum.

3. If a ratio is limited by such restrictions as seating capacity, equipment available, etc., comment on separate paper. Include in the comment an estimate of the ratio if restrictions were removed.

	TYPE OF INSTRUCTION									
SUBJ #	Recitation	Lecture	Lecture-Film	Lecture-Demonstration	Lecture-Practical	Directed Discussion	Seminar	Practical	Supervised Study	Exam
A										
D										
M										
A										
D										
M										
A										
D										
M										
A										
D										
M										

TABLE V. PREPARATION TIME (HOURS)

Directions: 1. List all subjects.

2. For each subject, indicate your opinion regarding the number of hours that the instructor should have available to prepare for effective instruction in the types of instruction normally used in that subject. Preparation time includes review of lesson plan, research, preparation of equipment, preparation of quizes, etc.

SUBJ #	TYPE OF INSTRUCTION									
	Recitation	Lecture	Lecture-Film	Lecture-Demonstration	Lecture-Practical	Directed Discussion	Seminar	Practical	Supervised Study	Exam

TABLE VI. INSTRUCTOR ACTIVITIES

During the course of an average week, what is the total number of school hours that instructors are engaged in the following activities or are absent for the following reasons?

1. Preparation and revision of lesson plans.	
2. Design, manufacture, and repair of training aids.	
3. Individual instruction.	
4. Student conferences and interviews.	
5. Supervision of student activities (study halls, etc.)	
6. Clerical work (preparation of reports, grades, etc.)	
7. Maintenance and repair of school equipment.	
8. Logistic activities or liason with logistic support organization.	
9. Collateral duties. (On the back of this page list these duties and the number of instructor-hours per week each requires.)	
10. In-service training.	
11. Sickness.	
12. Disciplinary reasons.	
Others: (Note: Leave will be considered separately.)	

MISCELLANEOUS QUESTIONS

1. What is the length of the class period?	
2. How many class periods per day?	
3. Must a new lesson plan be prepared for each class period or are lesson plans reusable?	
4. Relative to his instructional duties, what is the average number of weeks required by a new instructor to attain	
25% proficiency?	
50% proficiency?	
75% proficiency?	
100% proficiency?	
5. What percentage of instructors never attain 100% proficiency?	
6. What is the school's instructor allowance?	
7. Have instructors been assigned to the school on the basis of a student/instructor ratio? If so, what is that ratio?	
8. How many hours per week do your instructors teach?	
9. In your opinion, how many hours per week should your instructors teach?	

c/o Professor of
Naval Science
Stanford University
Stanford, Calif.
2 March 1950

Officer-in-Charge
U.S. Naval School, ____________
__________________, ____________

Dear Sir,

It has come to my attention that my questionnaire concerning instructor allowances is imposing an undue burden of research on school staffs. Such an imposition is unintentional. Therefore, please disregard the remainder of the questionnaire and return to me those parts already completed.

In order to make this survey meaningful and useful to the Navy, I should like to include certain data pertaining to all BuPers schools; data which will have been furnished in completed questionnaires. In the event that you have not completed the portions of the questionnaire referenced below, please forward to me the following information if it can be supplied without time-consuming research:

1. A copy of the course outline for each course (to provide data for TABLE I of the questionnaire.)
2. The quota for each course and the frequency of the convening dates (basic data for TABLE II of the questionnaire.)
    a. The number of students originally enrolled in each course during July-December 1949.
3. A copy of a class schedule for each course (to provide data for TABLE III of the questionnaire.)
4. TABLE VI, INSTRUCTOR ACTIVITIES, resubmitted herein.

Thank you for your assistance and cooperation.

Very truly yours,

O.C. Dickes
LCDR, USN

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